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The Influence of Sheared Parallel Flows on Collisionless Magnetic Reconnection V. ROYTERSHTEYN, The University of Iowa, W. DAUGHTON, Los Alamos National Laboratory — The first results of an ongoing study of the influence of sheared parallel flows on collisionless magnetic reconnection are presented. In particular, we focus on the linear stability of a newly developed exact kinetic equilibrium which incorporates sheared parallel flows into the well-known Harris current sheet configuration. Using a variety of tools including analytical theory, numerical solution of the complete linearized Vlasov-Maxwell system, and fully kinetic 2D PIC simulations, we demonstrate that the stability properties of a thin current sheet in the presence of significant (of the order of ion thermal speed) flows differ significantly from those predicted by MHD analysis. Large flow shear is typically found to have a stabilizing influence on the reconnecting mode, while the shear-driven instability, which has been proposed as the mechanism responsible for the onset of reconnection, is either completely stable, or has growth rate that is dramatically lower than that predicted by MHD analysis. Preliminary results from nonlinear PIC simulations indicate that the onset of fast reconnection proceeds in a manner that is similar to that in the absence of the flow. None of the simulations exhibit highly wrapped vortices typically produced by MHD simulations of similar configurations.

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